WE CLAIM:

1. A method for providing a biocompatible, nonimmunogenic coating on the surface of a synthetic implant, comprising:

(a) providing a first crosslinkable component having m nucleophilic groups, wherein $m \geq 2$;

(b) providing a second crosslinkable component having n electrophilic groups capable of reaction with the m nucleophilic groups to form covalent bonds, wherein $n \geq 2$ and $m + n \geq 5$;

(c) applying the first and second crosslinkable components to a surface of a synthetic implant to provide a coating thereon; and

(d) allowing the components to crosslink *in situ* to provide a synthetic implant coated with a biocompatible, nonimmunogenic composition,

wherein the first and second crosslinkable components are biocompatible, synthetic, and nonimmunogenic.

2. The method of claim 1, wherein step (c) comprises simultaneously applying the first and second crosslinkable components to the surface of the synthetic implant to provide a coating thereon.

3. The method of claim 2, wherein prior to step (c), the first and second crosslinkable components are admixed to provide a reaction mixture and initiate crosslinking, and step (c) comprises applying the reaction mixture to the surface of the synthetic implant to provide a coating thereon.

4. The method of claim 3, wherein the reaction mixture has a net neutral charge.

5. The method of claim 1, wherein the synthetic implant is an artificial blood vessel, a heart valve, a vascular graft, a vascular stent, or a vascular graft/stent combination.

6. The method of claim 1, wherein the synthetic implant is an implantable surgical membrane.

7. The method of claim 6, wherein the implantable surgical membrane is monofilament polypropylene.

8. The method of claim 6, wherein the implantable surgical membrane is a mesh for use in hernia repair.

9. The method of claim 1, wherein the synthetic implant is a breast implant.

10. The method of claim 1, wherein the synthetic implant is a lenticule.

11. The method of claim 1, wherein the m nucleophilic groups in the first crosslinkable component are identical.

12. The method of claim 1, wherein at least two of the m nucleophilic groups in the first crosslinkable component are different.

13. The method of claim 1, wherein the n electrophilic groups in the second crosslinkable component are identical.

14. The method of claim 11, wherein the n electrophilic groups in the second crosslinkable component are identical.

15. The method of claim 12, wherein the n electrophilic groups in the second crosslinkable component are identical.

16. The method of claim 1, wherein the n electrophilic groups in the second crosslinkable component are different.

17. The method of claim 11, wherein at least two of the n electrophilic groups in the second crosslinkable component are different.

18. The method of claim 12, wherein at least two of the n electrophilic groups in the second crosslinkable component are different.

19. The method of claim 1, wherein the m nucleophilic groups are bound to the first crosslinkable component through linking groups.

20. The method of claim 1, wherein the n nucleophilic groups are bound to the second crosslinkable component through linking groups.

21. The method of claim 1, wherein at least one of the first and second crosslinkable components is comprised of a hydrophilic polymer.

22. The method of claim 1, wherein at least one of the first and second crosslinkable components is comprised of a hydrophobic polymer.

23. The method of claim 1, wherein the m nucleophilic groups are primary amino groups.

24. The method of claim 23, wherein the first crosslinkable component is C_2-C_6 hydrocarbyl susbstituted with amino groups.

25. The method of claim 23, wherein the first crosslinkable component is a secondary or tertiary amine $NR_1R_2R_3$ wherein R_1 is hydrogen or an amino-substituted lower alkyl group, and R_2 and R_3 are amino-substituted lower alkyl groups.

26. The method of claim 23, wherein the n electrophilic groups are selected from the group consisting of succinimidyl ester, sulfosuccinimidyl ester, maleimido, epoxy, isocyanato, thioisocyanato, and ethenesulfonyl.

27. The method of claim 26, wherein the n electrophilic groups are selected from the group consisting of succinimidyl ester and sulfosuccinimidyl ester.

28. The method of claim 1, wherein the m nucleophilic groups are sulfhydryl groups.

29. The method of claim 28, wherein the n electrophilic groups are sulfhydryl-reactive groups selected so as to form a thioester, thioether, or disulfide linkage upon reaction with the sulfhydryl groups.

30. The method of claim 1, wherein n=2.

31. The method of claim 1, wherein m=2.

32. The method of claim 1, wherein the crosslinking conditions comprise admixture in an aqueous medium.

33. The method of claim 32, wherein the first and second crosslinkable components each represent about 0.5 wt.% to about 20 wt.% of the composition formed upon admixture.

34. The method of claim 32, wherein the crosslinking conditions further comprise admixture at a pH in the range of 7 to 8.

35. The method of claim 34, wherein the first and second crosslinkable components are at concentrations of 20 mg/mL to 200 mg/mL of the composition formed upon admixture.

36. The method of claim 1, wherein the first crosslinkable component is in an aqueous solution, the second crosslinkable component is in dry, particulate form, and admixing comprises combining the second crosslinkable component with the aqueous solution of the first crosslinkable component.

37. The method of claim 36, wherein the first and second crosslinkable components each represent about 0.5wt % to about 20 wt.% of the composition formed upon admixture.

38. The method of claim 36, wherein the crosslinking conditions further comprise admixture at a pH in the range of 7 to 8.

39. The method of claim 38, wherein the first and second crosslinkable components are at concentrations of 20 mg/mL to 200 mg/mL of the composition formed upon admixture.

40. The method of claim 1, wherein the first crosslinkable component is present in a molar excess relative to the second crosslinkable component.

41. The method of claim 1, wherein the second crosslinkable component is present in a molar excess relative to the first crosslinkable component.

42. A synthetic implant coated according to the method of claim 1.